

PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Application No.: 10/723,898

Filing Date: 11/25/03

Applicant: Mead et al.

Group Art Unit: 1773

Examiner: Kevin R. Kruer

Title: PLASTISOL COATING CONTAINING REFLECTIVE PIGMENTS,
METHOD OF PREPARING COATING ON A SUBSTRATE, AND
PRODUCTS WITH SUCH COATINGS

Attorney Docket: 0906S-000336 (IN-5692)

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Commissioner for Patents
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APPLICANT'S APPEAL BRIEF UNDER 37 C.F.R. § 41.37

Sir:

This is an appeal from the final rejection mailed June 5, 2007. A Notice of Appeal was filed August 28, 2007. This Brief is submitted along with the fee due under 37 C.F.R. § 41.20(b)(2). This Brief is accompanied by a petition under 37 C.F.R. § 1.136(a) for a one-month extension of time and the fee for the extension. With this extension, this Brief is due by November 28, 2007.

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Real Party in Interest

The real party in interest is BASF Corporation, having a place of business at 26701 Telegraph Road, Southfield, Michigan 48225, to which the inventors have assigned all rights in this invention. The assignment was recorded in the United States Patent and Trademark Office on November 25, 2003, at reel/frame: 014760/0379.

Related Appeals and Interferences

There are no related appeals or interferences.

Status of Claims

Claims 7, 10, 11, 13, 14, 16-20, and 25-26 are pending and stand finally rejected. Claims 1-6, 8, 9, 12, 15, and 21-24 are cancelled. This appeal is taken as to all of the rejected claims.

Status of Amendments

There have been no amendments since the final rejection.

Summary of Claimed Subject Matter

Claims 7, 11, 16, 19 and 20 are independent claims. Independent claim 7 claims to a film that is applied to an article, such as architectural siding, in order to reflect the infrared (IR) component of sunlight to thereby reduce heat build-up. Page 2, lines 8-10. The film is formed by applying and coalescing a plastisol composition to a substrate comprising a poly(vinyl chloride) polymer, at least one plasticizer, and an infrared-reflective pigment. Page 2, line 20 to page 3, line 8; page 7, line 22 to page 8, line 1. The amount of infrared-reflective pigment is sufficient so that there is essentially no transmittance of light of near infrared wavelength through the film. Page 7, lines 16-19. The film is from about 2 mils to about 5 mils thick. Page 8, lines 7-8. Claims 10, 25, and 26 are dependent on claim 7.

Independent claim 11 is drawn to an article of architectural siding comprising an outer coating layer comprising a poly(vinyl chloride) polymer, at least one plasticizer, and an infrared-reflective pigment. Page 7, line 22 to page 8, line 1; page 8, lines 14-15. The outer coating layer is from about 2 mils to about 5 mils thick, and the infrared-reflective pigment is in a sufficient amount so that there is essentially no transmittance of light of near infrared wavelength through the layer. Page 7, lines 16-19; page 8, lines 7-8. Claims 13 and 14 are dependent on claim 11.

Independent claim 16 is drawn to an article of architectural siding formed by a method that includes forming a coating layer on a backing material. A layer of a plastisol composition is applied to the backing material and fused with heat, the layer being about 2 mils to about 5 mils thick and comprising a poly(vinyl chloride) polymer, at

least one plasticizer, and an infrared-reflective pigment. Page 7, line 21 to page 8, line 8. The coating layer is removed from the backing material and laminated to a piece of architectural siding material, and the laminated architectural siding material is shaped into a desired profile. Page 8, lines 9-15; page 9, lines 2-6. Claims 17 and 18 are dependent on Claim 16.

Independent claim 19 claims a coated article including at least one coating layer. Page 4, lines 8-12. The coating layer comprises a poly(vinyl chloride) polymer, at least one plasticizer, and an infrared-reflective pigment in a sufficient amount so that there is essentially no transmittance of light of near infrared wavelength through the layer. The layer is an outer layer from about 2 mils to about 5 mils thick. Page 4, lines 11-12. The article is a piece of vinyl siding or a trim piece for vinyl siding. Page 4, line 11.

Independent claim 20 is drawn to an article having on it a layer of a plasticized poly(vinyl chloride) polymer, which includes a sufficient amount of an infrared reflective pigment so that there is essentially no transmittance of light of near infrared wavelength through the layer. Page 4, lines 8-10 and page 7, lines 16-19. The article is vinyl siding or trim and the layer is about 2 to about 5 mils thick. Page 9, lines 6-8.

Increasing IR-reflectance can reduce the heat build-up in a building and can lower energy costs. Page 2, lines 8-10. However, incorporating a sufficient amount of pigment directly into vinyl siding to obtain the desired reflectance would add significant expense to the product. Page 2, lines 10-11. Including the pigment in the vinyl siding can also have an effect on the tensile properties of the siding and can interfere with other properties needed for the siding. Page 2, lines 12-14. The present invention provides a solution by including the IR-reflective pigment in a thin film/layer (as claimed, from about

2-5 mils) to effectively reduce heat build-up on the siding while at the same time minimizing the amount of material and IR-reflective pigment that must be applied to the siding. A building can thus be protected by applying siding having the present layer or film. Page 4, lines 13-16.

Grounds of Rejection to be Reviewed on Appeal

Three separate 35 USC 103(a) rejections are to be reviewed on appeal: (1) claims 7, 10, 11, 13, 16, 17, 19, 20, and 24 are rejected under 35 USC 103(a) as allegedly obvious over Ravinovitch, U.S. Patent No. 4,424,292, in view of Krafft, U.S. Patent No. 4,056,397; (2) claims 14 and 18 are rejected under 35 USC 103(a) as allegedly obvious over Ravinovitch in view of Krafft and Sullivan, U.S. Patent No. 6,416,868; and (3) claims 7, 10, 11, 13, 16, 17, 25, and 26 are rejected under 35 USC 103(a) as allegedly obvious over Stamper, U.S. Patent No. 4,574,103.

Argument

- I. The combination of Ravinovitch with Kraft cannot establish a *prima facie* case of obviousness of claims 7, 10, 11, 13, 16, 17, 19, 20, and 24 as the combination fails to include or suggest the claimed film or layer thickness and there is no apparent reason for a skilled artisan to modify the prior art to include the missing film or layer thickness.

The combination of Ravinovitch in view of Kraft does not teach or suggest the claimed thickness found in claims 7, 10, 11, 13, 16, 17, 19, 20, and 24. The prior art also does not provide any reason for making a film or layer of the claimed thickness or applying it to a substrate and does not identify why such modification may be desirable. Moreover, the Examiner has not explicitly identified an apparent reason based on the general knowledge in the art as to why a skilled artisan would modify the reference teachings to recreate Applicants' claims or expect success in doing so.

To establish a *prima facie* case of obviousness, the combined prior art references must teach or suggest all the claim limitations. *In re Vaeck*, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991). If the references are missing claimed features, there must be some apparent reason either in the references or the general knowledge in the art to modify the references to include the missing subject matter. *KSR Int'l Co. v. Teleflex Inc.*, 127 S.Ct. 1727, 1740-41, 82 USPQ2d 1365, 1396 (2007). The Examiner should make the apparent reason to combine or modify the references explicit to facilitate review. *KSR Int'l Co. v. Teleflex Inc.*, 127 S.Ct. at 1740-41, 82 USPQ2d at 1396; and

see *In re Kahn*, 441 F3d 977, 988, 78 USPQ2d 1329, 1336 (Fed. Cir. 2006) (“[R]ejections on obviousness grounds cannot be sustained by mere conclusory statements; instead, there must be some articulated reasoning to support the legal conclusion of obviousness.”).

The present reference combination fails to teach a film or layer from about 2 mils to about 5 mils thick. The Ravinovitch patent teaches compositions for making vinyl house siding where the siding may be all one piece or an extruded composite of a capstock over a substrate, with the capstock or siding containing an IR-reflecting pigment. Ravinovitch col. 3, lines 13-22. The various capstock samples of Example I in Ravinovitch have thicknesses of 0.45 in., which equals 450 mils (1 mil = 0.001 inch). Ravinovitch col. 4, line 58 to col. 5, line 1. Ravinovitch does not teach or suggest any other capstock thicknesses, and the reference does not provide any motivation for changing the capstock thickness. Consequently, the Ravinovitch patent does not teach the claimed thickness.

The Krafft patent does not teach or suggest vinyl capstock of any thickness whatsoever. Instead, the Krafft patent teaches photographic monosheet material that contains a light reflecting white pigment layer designed to reflect visible light in order to mask the image silver and form a light proof seal. Krafft abstract; col. 1, lines 4-5; col. 2, lines 49-50. The person of ordinary skill in the vinyl siding art would not view photograph material as equivalent to architectural siding, or the Kraft patent as instructive for architectural siding. The Examiner and Applicants agree that, “at best, Krafft informs the skilled artisan that increasing a pigment layer thickness can increase reflectivity.” Advisory Action from Oct. 17, 2006, page 2, lines 15-18.

At best, the combination of the Ravinovitch and Krafft disclosures appears to involve modifying the vinyl composition containing the IR-reflective pigment (as per Ravinovitch) by increasing thickness of the material to increase reflectance (as per Krafft). Taking the Ravinovitch capstock and applying the teachings of Krafft, the skilled artisan would be led to make a capstock having a thickness of greater than 450 mils. This combination, viewing the reference teachings as a whole, is silent regarding a film or layer of about 2 mils to about 5 mils thick, as found in Applicants' claims. Furthermore, the references are silent regarding decreasing the thickness of a material, which presumably would decrease reflectance as per Krafft.

Furthermore, the claims rejected by the combination of Ravinovitch and Krafft (with the exception of claim 16) further include the express feature that the film or layer has an amount of IR-reflective pigment such that there is "essentially no transmittance of light of near infrared wavelength." Therefore, these claims require an amount of pigment to prevent essentially all transmittance of IR light, in addition to the film or layer being from about 2 mils to about 5 mils thick.

The present invention provides the benefits of including the IR-reflective pigment in a thin film/layer (from about 2-5 mils) to effectively reduce heat build-up on the siding while at the same time minimizing the amount of material and IR-reflective pigment that must be applied to the siding, thereby reducing costs. For example, having IR-reflective pigment throughout a vinyl siding composition or within a thick layer of vinyl capstock (as per Ravinovitch) can add significant expense. Present application, page 2, lines 10-11. In addition, the present invention solves issues relating to tensile properties, among other properties, caused by concentrations of IR-reflective pigment that would be

necessary to achieve the desired reflectance when the pigment is present throughout the vinyl siding. Present application, page 2, lines 11-14.

The Examiner alleges that "it would have been obvious to one of ordinary skill in the art to add sufficient pigment in order to block the desired amount of infrared energy. The motivation for doing so would have been to reduce heating of the article." Office Action from June 5, 2007, page 4, lines 5-8. However, a skilled artisan taking capstock (as per Ravinovitch) with the alleged motivation to block the desired amount of infrared energy would simply modify the capstock by increasing the thickness (as per the Krafft teaching) to further block transmittance of IR light. Nothing in the references or in the Examiner's rejection suggests modifying the combination by reducing the thickness of the Ravinovitch capstock two orders of magnitude (e.g., from 450 mils down to about 2 to 5 mils) while simultaneously using an amount of IR-reflecting pigment so that there is essentially no transmittance of IR light. Only the present claims recite a thin film/layer that blocks IR light, consequently saving on the expense of IR-reflective pigment and maintaining the tensile properties of the underlying siding by separating the pigment composition from the siding composition.

Nowhere in the Ravinovitch and Krafft references or in the Examiner's rejection is there found any appreciation regarding the problems solved by Applicants' claims. Nor is there any reason or desirability identified by which a skilled artisan would shrink the Ravinovitch capstock by over two orders of magnitude while maintaining IR-reflectance. "[R]ejections on obviousness grounds cannot be sustained by mere conclusory statements; instead, there must be some articulated reasoning to support the legal conclusion of obviousness." *In re Kahn*, 441 F3d 977, 988 (Fed. Cir. 2006). In this case,

the Examiner has failed to identify support in the Ravinovitch and Krafft reference combination by which a skilled artisan would recreate Applicants' claims.

In effect, the Ravinovitch patent in view of the Krafft patent teaches away from the present claims. If a skilled artisan were to combine Ravinovitch with the Krafft teachings, the skilled artisan would take the capstock from Ravinovitch, and applying the result effective variable from Krafft (i.e., increasing thickness increases reflectance), would subsequently increase the thickness in order to optimize the reflection spectra of the layer to the point that there is no transmittance of IR light. Since the capstock disclosed in Ravinovitch is 450 mils, the skilled artisan would only be motivated to increase the thickness, thereby producing capstock greater than 450 mils. "A prima facie case of obviousness can be rebutted if the applicant...can show 'that the art in any material respect taught away' from the claimed invention." *In re Geisler*, 116 F.3d 1465, 1469, 43 USPQ2d 1362, 1365 (Fed. Cir. 1997) (quoting *In re Malagari*, 499 F.2d 1297, 1303, 182 USPQ 549, 553 (C.C.P.A. 1974)). "A reference may be said to teach away when a person of ordinary skill, upon reading the reference,...would be led in a direction divergent from the path that was taken by the applicant." *Tec Air, Inc. v. Denso Mfg. Mich. Inc.*, 192 F.3d 1353, 1360, 52 USPQ2d 1294, 1298 (Fed. Cir. 1999). In this case, as in *Geisler* and *TecAir*, the references teach away from Appellants' invention.

Finally, the Examiner provided no reason based on the general knowledge in the art for a skilled artisan to modify the combination to include a film or layer from about 2 mils to about 5 mils thick. In the present case, the Examiner's rejection lacks any reason based on the general knowledge in the art that supports why a skilled artisan would modify the Ravinovitch capstock by reducing its thickness by two orders of magnitude

and further use an amount of IR-reflective pigment to provide essentially no transmittance of IR light.

The Examiner apparently tries to rectify this deficiency by alleging that "the skilled artisan would have known that the typical capstock is within the claimed thickness range," page 6 of the Office Action from June 5, 2007, and points to several references listed on page 7 of the Office Action as apparent support. However, a careful reading of these references reveals not one disclosure of a film or layer from about 2 mils to about 5 mils, and none of these references contemplate use of an IR-reflective pigment.

Accordingly, a *prima facie* case of obviousness cannot be established using the cited references as the combination does not disclose all the claimed features. In addition, no general knowledge in the art is provided that would account for the noted deficiencies. Claims 7, 10, 11, 13, 16, 17, 19, 20, and 24 include a nonobvious thickness feature absent in the art of record and are therefore patentable.

In view of the preceding remarks, the 35 U.S.C. § 103 rejection based on Ravinovitch in view of Krafft should be REVERSED.

II. Claims 14 and 18 are patentable over the cited references because the Sullivan disclosure fails to cure the deficiencies of the combination of the Ravinovitch and Krafft patents.

Dependent claims 14 and 18 are patentable over the cited combination of Ravinovitch in view of Krafft and further in view of Sullivan because the Ravinovitch-Krafft

combination does not teach the claimed film or layer thickness or the claimed amount of IR-reflective pigment and the addition of Sullivan for the disclosure of aluminum does not account for these noted deficiencies.

Sullivan teaches plastic, rubber, paint and other compositions that contain IR-reflective pigments used to coat various substrates including metal. Sullivan col. 6, lines 47-53. The Examiner cites Sullivan as disclosing metal siding. The alleged motivation for including Sullivan in the combination of Ravinovitch and Krafft is that Sullivan teaches IR induced heat buildup is an issue on metal substrates as well as plastic substrates. Office Action from June 5, 2007, page 4, lines 14-18.

However, as demonstrated in the preceding section, a skilled artisan modifying the teachings of Ravinovitch with the proposition from Krafft would produce a capstock layer of greater than 450 mils in any attempt to optimize reflectivity; i.e., increasing thickness to increase reflectivity, as Krafft teaches. Nothing in the combination provides any reason by which a skilled artisan would modify the teachings therein to make a coating layer of about 2-5 mils in thickness that has an amount of IR-reflective pigment providing essentially no transmittance of IR light. Likewise, no reason is provided by the Examiner based on the general knowledge in the art to do the same. The Sullivan reference is also silent on these subjects; Sullivan is used solely for the teaching of coating metallic substrates.

Thus, no combination of these three references would produce a film or coating layer from about 2 mils to about 5 mils that is applied to an aluminum article and that provides essentially no transmittance of light of near infrared wavelength, as found in

claims 14 and 18. These claims are therefore nonobvious and patentable over the art of record.

In view of the preceding remarks, the 35 U.S.C. § 103 rejection based on Ravinovitch in view of Krafft and Sullivan should be REVERSED.

III. Stamper cannot establish a *prima facie* case of obviousness of claims 7, 10, 11, 13, 16, 17, 25, and 26 as the reference fails to teach or suggest the claimed film or layer thickness or the use of an amount of IR-reflective pigment that provides essentially no transmittance of IR light and no apparent reason is provided by which a skilled artisan would be motivated to include the missing subject matter.

In the present case, the Stamper reference fails to disclose the claimed film or layer of about 2 mils to about 5 mils thick. In addition, these claims (with the exception of 16 and 17) include an amount of IR-reflective pigment that provides essentially no transmittance of IR light through the film or layer.

A case of obviousness requires that the prior art reference teach or suggest all the claim limitations and also requires some suggestion or motivation either in the reference or in the general knowledge in the art upon which to base modification of the reference. An obviousness inquiry further includes looking to interrelated reference teachings and the background knowledge possessed by a person having ordinary skill in the art to determine whether there is an apparent reason to combine known elements in the fashion claimed.

Stamper discloses a laminate of two layers. A first layer of vinyl chloride polymer containing Sb_2O_3 is cast or reverse coated on release paper. Next, a second layer of vinyl chloride polymer containing TiO_2 is cast or reverse roller coated on the first layer. The laminate can then be wound up on a take-off roll. Each layer of the laminate has a thickness of from about 12-50 mils, so that overall the laminate has a total thickness of from about 24-100 mils. Stamper col. 2, lines 21-41. Thus, the Stamper laminate, and even the individual layers, do not include a film or layer from about 2 mils to about 5 mils.

Stamper therefore fails to teach all the features of the present claims. It is also notable that a skilled artisan would not separate the layers in the Stamper laminate, so the laminate thickness of 24-100 mils stands in contrast to the presently claimed thickness. Specifically, the Stamper laminate must be considered as a whole. The Sb_2O_3 acts as a fire retardant and the TiO_2 layer protects the Sb_2O_3 layer since in sunlight Sb_2O_3 adversely affects PVC. Stamper col. 1, lines 32-39. Thus, it is a goal of the Stamper reference to use the TiO_2 layer to protect the Sb_2O_3 layer from sunlight thereby protecting the PVC. Consequently, there is no apparent reason to separate the TiO_2 layer from the Sb_2O_3 layer, and, in fact, Stamper is expressly teaching away from separating the layers. Therefore, the Stamper laminate of 24-100 mils does not render the present invention obvious, as the Stamper thickness is not the same as the film or coating layer of the present claims, which are about 2 mils to about 5 mils thick.

In addition, Stamper does not provide any basis for the Examiner's suggestion that the TiO_2 layer provides essentially no transmittance of light of near infrared wavelength. Instead, the goal of the TiO_2 layer in the Stamper reference is protect the Sb_2O_3 layer from sunlight, since in sunlight Sb_2O_3 adversely affects PVC. There is

nothing in Stamper to suggest that the amount of protection required for the Sb₂O₃ layer equates to no transmittance of light of near infrared wavelength. In fact, Stamper is completely silent as to what type, level, or extent of protection is necessary to keep the Sb₂O₃ from adversely affecting the PVC.

A generally known problem with PVC is damage by ultraviolet (UV) light, and the TiO₂ layer is likely protecting the PVC substrate from the UV component of sunlight. See paragraph [0008] of US 2003/0008959 to Crabb et al. A skilled artisan would not infer or be motivated from the Stamper reference or elsewhere in the prior art that one can or should use an infrared reflective pigment in an amount to provide essentially no transmittance of light of near infrared wavelength. The issues of IR-reflectance and reduction of heat-buildup are not even contemplated by the Stamper reference.

In sum, since the Stamper laminate is thicker than the film and coating layer of the present claims and no reason is provided by which a skilled artisan would modify the Stamper teachings, the reference does not render the present claims obvious. In addition, Stamper is completely silent as to providing a layer having essentially no transmittance of light of near infrared wavelength, and is instead focused on preventing the adverse effects of Sb₂O₃ on PVC. There is no teaching or suggestion, here or elsewhere, that preventing adverse effects of light plus Sb₂O₃ is synonymous with preventing IR transmittance. Consequently, there is no reason to re-engineer the reference to include an IR-reflective pigment in an amount so that there is essentially no transmittance of light of near IR wavelength. Accordingly, the present claims are not obvious and are patentable over Stamper.

In view of the preceding remarks, the 35 U.S.C. § 103 rejection based on Stamper should be REVERSED.

For these and the other reasons discussed above, Applicants respectfully request that the rejection of claims 7, 10, 11, 13, 14, 16-20, and 24-26 be REVERSED.

Respectfully submitted,

Dated: November 28, 2007

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Claims Appendix

7. A film prepared by applying to a substrate a plastisol composition comprising a poly(vinyl chloride) polymer, at least one plasticizer, and an infrared-reflective pigment in a sufficient amount so that there is essentially no transmittance of light of near infrared wavelength through the film, and coalescing the applied composition to produce the film, wherein the film is from about 2 mils to about 5 mils thick.
10. A film according to claim 7, wherein the film is flexible.
11. An article of architectural siding, comprising an outer coating layer comprising a poly(vinyl chloride) polymer, at least one plasticizer, and an infrared-reflective pigment in a sufficient amount so that there is essentially no transmittance of light of near infrared wavelength through the layer, wherein the layer is from about 2 mils to about 5 mils thick.
13. An article of architectural siding according to claim 11, wherein the article of architectural siding is a vinyl article.
14. An article of architectural siding according to claim 11, wherein the article of architectural siding is an aluminum article.

16. An article of architectural siding formed according to the method of:
- (a) forming a coating layer on a backing material by applying to the backing material a layer of a plastisol composition from about 2 mils to about 5 mils thick comprising a poly(vinyl chloride) polymer, at least one plasticizer, and an infrared-reflective pigment and fusing the applied plastisol layer into a coating layer with heat;
 - (b) removing the coating layer from the backing material and laminating the coating layer to a piece of architectural siding material; and
 - (c) shaping the piece of laminated architectural siding material into a desired profile.
17. An article of architectural siding according to claim 16, wherein the article of architectural siding is a vinyl article.
18. An article of architectural siding according to claim 16, wherein the article of architectural siding is an aluminum article.
19. A coated article, comprising at least one coating layer comprising a poly(vinyl chloride) polymer, at least one plasticizer, and an infrared-reflective pigment in a sufficient amount so that there is essentially no transmittance of light of near infrared wavelength through the layer, wherein the article is a piece of vinyl siding or a trim piece for vinyl siding and the layer is an outer layer from about 2 mils to about 5 mils thick.

20. An article having thereon a layer of a plasticized poly(vinyl chloride) polymer, the layer further including an infrared reflective pigment in a sufficient amount so that there is essentially no transmittance of light of near infrared wavelength through the layer, wherein the article is a piece of vinyl siding or a trim piece for vinyl siding and the layer is an outer layer from about 2 mils to about 5 mils thick.

25. A film according to claim 7, wherein the film is a roll of film.

26. A film according to claim 7, wherein said substrate is paper.

Evidence Appendix

There is no evidence submitted pursuant to 37 C.F.R. §§ 1.130, 1.131, or 1.132.

Related Proceedings Appendix

There have been no related appeals and interferences and therefore no related decisions exist.

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